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Ecological materials for interior design use

Impact of wood and recycling materials, for people lives and the environment.

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DECLARAÇÃO DE AUTORIA

Eu Wiktoria Natalia Trela, declaro que a presente dissertação / trabalho de projeto de mestrado intitulada "Ecological materials for interior design use", é o resultado da minha investigação pessoal e independente. O conteúdo é original e todas as fontes consultadas estão devidamente mencionadas na bibliografia ou outras listagens de fontes documentais, tal como todas as citações diretas ou indiretas têm devida indicação ao longo do trabalho segundo as normas académicas.

O Candidato
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RESUMO

Materiais ecológicos são materiais que apresentam bom desempenho, métodos de fabrico e aplicação e são reciclados, tendo apenas um baixo impacto no meio ambiente e sendo seguros para os seus usuários. Os materiais ecológicos podem ser separados em diferentes categorias e conter materiais recicláveis, ou seja, materiais que não contêm substâncias perigosas, feitos com baixo consumo de energia, em condições limpas, materiais que não contaminam o ar e a água, economizando, ainda, energia. Os materiais que usamos no nosso entorno têm um grande efeito em como percebemos e vemos a área ao nosso redor e como isso nos afecta. Educando progressivamente sobre os benefícios de um ambiente não-tóxico na nossa saúde e conforto, mudanças positivas podem ser implementadas em todas as áreas da vida humana, com casas ecológicas no centro das atenções. O uso de materiais apropriados em interiores pode ajudar a criar uma atmosfera relaxante e saudável em casas propícias a uma sensação de bem-estar. De acordo com um estudo sobre o impacto ambiental na saúde mental, os humanos preferem uma paisagem natural em detrimento de um cenário artificial. O contacto com a natureza tem um tremendo efeito sobre os níveis de stress, bem-estar e saúde geral em humanos.

A segunda parte deste trabalho consiste na investigação de madeira e materiais recicláveis. O material mais utilizado e compreendido no design de interiores é a madeira. A madeira é forte, natural, estética, orgânica, prontamente acessível, enfim, é um material leve e simples de trabalhar. Existem muitas cores, texturas e padrões diferentes, proporcionando muitas possibilidades no uso deste material em design de interiores. Ao discutir materiais ecológicos, é necessário mencionar materiais recicláveis. A Rede Global de Reciclagem define a reciclagem como um "processo pelo qual os materiais que de outra forma se transformariam em resíduos sólidos são recolhidos, separados ou processados e devolvidos à economia tradicional para serem reutilizados na forma de matérias-primas ou produtos acabados" (Robbins, 2007). Isto significa que a reciclagem transforma os resíduos em recursos. São muitos os benefícios deste processo, como ambiental, económico ou social. A reciclagem é principalmente associada a materiais como a madeira, o metal, o vidro, plásticos e papel.

Palavras-Chave:
Materiais ecológicos, madeira, reciclagem, consciência ecológica, design de interiores

ABSTRACT

Ecological materials are materials that have good performance, manufacture methods, application and are recycled, while having only a low impact on the environment and being safe for their users. Eco friendly-materials can be separated into different categories and hold recyclable materials, materials which are free from dangerous substances, materials made with low energy consumption, made in clean conditions, materials that chasten contaminated air and water and materials which are competent and resource-saving while still granting high representation. Materials that we use in our surrounding have a big effect on how we notice and see our the area around us and how it affects us. By progressive educating on the benefits of a non-toxic environment on our health and comfort, positive changes can be implemented in all areas of human lives, with environmentally friendly houses being at the center of attention. The use of appropriate materials in interiors can help create relaxing, healthy atmosphere in homes that is propitious to a feeling of well-being. According to a study on the environmental impact on mental health, humans prefer natural landscape to an artificial scenery. Contact with nature has tremendous effect on stress levels, well-being and overall health in humans.

Second part of this work is investigating wood and recyclable materials. The most commonly used and understood material in interior design is wood. Wood is strong, natural, aesthetic, organic, readily accessible, lightweight and simple material to work. There are many different colors, textures, patterns, which gives many possibilities to use wood in interior design. When discussing ecological materials, it is necessary to mention recyclable materials. Global Recycling Network defines recycling as a 'Process by which materials that would otherwise become solid waste are collected, separated or processed and returned to the economic mainstream to be reused in the form of raw materials or finished goods.''(Robbins, 2007) It means that recycling changes wastes into resource. There are many benefits of this process such as environmental, economical or social. Recycling is mostly associated with materials like wood, metal, glass, plastics and paper.

Keywords:
Ecological materials, wood, recycling, ecological awareness, interior design

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CONTENTS

Since the subject of sustainability is very common media nowadays and also our human nature is being interested in the subject, We decided to make an investigation about ecological materials for interior design use. I focused specifically on the use of timber and the recycling materials. Ecological materials are materials which have a good impact on people and environment in the whole life cycle, from segregation to transport. Eco materials as 'friendly materials or "environmentally friendly" which play a huge part in science and technology. Environmental awareness is a catchword that plays an important role today. The term refers to two distinct environments. First is rational beings, the higher mental states like people and we named this group : internal environment, and second group is external environment - the physical and biological space. Both environments work together and they are in strong relationship. Definitely, it is easier to imagine a world without people than people without Earth. In the present work was narrowed down the above global perspectives to local dimensions. We undertook a theoretical analysis of the impact of ecological materials on humans and the environment.

Searching for answers to questions, What impact on people and the environment have eco friendly materials which we use in interior design ? opened our eyes to the little knowledge people have about ecology and the world around us.

We conducted a survey about types of wood and their positive and negative properties. We analyzed many tree species in order to select the 10 most used types in interior design and describe their properties. The research, helped to know and understand, people’s needs, what kind of materials they like and want in their interiors, what kind of wood furniture they have and what kind of woods are the best for specific rooms.

Also was made an analysis about recycling materials and the process of recycling . The purpose of efforts has also been the topic of recycling, as a very forward-looking method of processing already existing objects. The research and analysis of this process over the past few years shows that the level of knowledge, imagination and social

responsibility for the environment, although growing year by year, remains relatively low. Unfortunately, as a society we are not active and engaged in environmental initiatives and activities, which aim at caring about environmental in both ways - personal and public life.

There are a number of factors to address the issue. For example, changing provisions of the environmental and waste laws, as well as EU directives, which will force our society to radically change its attitudes towards the environment.

First chapter is devoted to ecological awareness, the process of shaping ecological awareness and to concept of ecological materials. Next two sections are wood analysis. Timber impact on the environment and people, as well as methods of harvesting wood, use of wood in private and public spaces. The last chapter is about a very popular topic nowadays, about Recycling. We wanted to touch on aspects such as the economic and environmental impact of recycling, and what kind of materials can be recycled and what is the process of creating them.

METHODOLOGY

The idea about writing thesis about Ecological Materials, come from an appointment with architects, designers and developers of Eco Residents in Chyby in Poland. They were talking about technology of the house, how important is wood at homes and about ecological awareness nowadays. This review was a first step to understand, What impact on people and the environment have eco friendly materials which we use in interior design? The survey about recycling, types of wood and their positive and negative properties starts in libraries. I have analyzed many tree species in order to select the 10 most used types in interior design and describe their properties. Very helpful was internet, where many experts, and wood companies share their knowledge about ecological materials.

1. Ecological awareness

1.1. Concept of ecological awareness

The concept of ecological awareness, the same like the term awareness and ecology is not free from ambiguity. In general way it talks about the mental state of knowledge and beliefs about natural environment, as to the consequences of the content of understanding the relationship between the impact environmental quality on the quality of people's lives. Environmental conscience can be individual and social. It includes thinking of individual people and social standards in this field . Mostly we can stand out narrow and wide view of ecological awareness. Narrow term of ecological awareness nowadays means, knowledge, view and imagination about environment. In contrast wide view of ecological cognizance is seen as a result of "recognizing and appreciating the importance between economic activity of society and the process of nature devastation and degradation" A.Papuziński points out that the wide view of ecological awareness from the late sixties of the XX century referring to the idea of protection the nature. We can set apart two ideas: pragmatic and systematic. The pragmatic idea, is definitely more passive and presupposes the prevention of the destructive effects of economic activity on nature and humans. In this actives within pro-ecological initiatives in pragmatic think, includes initiatives aimed elimination of industrial pollution, the introduction of increasingly restrictive emission standards, the search for more environmentally friendly production technologies, the prevention of investments that threaten the environment, etc. Systemic nature protection is a more or less radical transformation in social life, aims at transforming the existing objectives into ecological context; It consist in creating civilization ecological vision and in undertaking and coordinating actions which will help to make it happened'. Ecological awareness, as emphasized by A. Papuziński, in his book says : ‚Ecological awareness is not a simple set of views, knowledge and imaginations about the environment; It is not even a group of ideas, values and opinions expressing human relations to the environment, "and in addition" the birth of ecological awareness is closely linked to the emergence of ecological social groups under the conditions of radical criticism of industrial society through the counter-cultural movements of the sixties of the past century (Papuziński, 2006).

Other author, Z. Hulla's in his book, wrote that ecological awareness exists in two categories: descriptive-technical and axiological-normative. The first of these is strictly ecological and imaginative, second one include systems of value between humans and environment, which in the next level lead to the definition of ecological ethics (Hull, 1984).

While ecological knowledge, in the description of Nakonieczna, consists the knowledge of "processes in biosphere and ecosystems" and includes "knowledge of dependencies and reciprocal relationships that equate systems, (…) and knowledge of pollution, as well as knowledge about how to counteract them „. Ecological imagination means " a sort of disposition, the ability to link between human activity and natural processes, the ability to design activities that comply with the requirements of ecological knowledge. " On the other hand, in the axiological-normative ecological consciousness, "a system of values and moral norms between humans and the environment „ (Nakonieczna, 2001).

1.2. Process of shaping ecological awareness

The process of shaping ecological awareness is influenced by internal structure as well as external motivators. Educational activities, social movements and political groups referring to the ecological ideology have great impact.

In the structure of ecological awareness, they are a few levels :

(1) intuitive intuition;

(2) intuitive intuition and knowledge about environmental dangers;

(3) emotional. (Gliński 1988).

The mentioned ecological awareness structure shows that everyone has congenital belief that natural environment has big influent of quality of life. (level 1)In the process of education and socialization people are made aware of connection between human activities and the environment (Level 2).). Within the growth of

ecological awareness, we ensure understanding of the mechanisms responsible for eg. environmental pollution but also grow even more emotional connexion with biosphere (level 3). Negative factors also have influence over the development of these emotional effects, such as ecological catastrophes as a consequence of human actions. But also positive factors which are effects of aesthetic needs. It is very important in shaping an ecological awareness.

Also ecological movements, "green" politics, or specific programs aimed at improving the environment, eg in the idea of sustainable development, are also of fundamental importance for shaping ecological awareness. According to Z. Friday, "caring for the environment as a goal of real political and educational action alters almost everything in value systems. It requires a break with purely instrumental treatment of nature by the human species, and that in turn requires a change of views on human nature and the place of man in nature'' (Weiner, 2000).

1.3. Concept of ecological materials

First definition of Ecological materials (or technologies of materials) is the ones that carry the characteristics of good performance, manufacture, usage and recycling or are prone of while having only a low impact on the environments while also being good for people. Surrounding-friendly ecological material goes in a various range and hold recyclable materials, materials which are free from dangerous substances, materials made with low energy consumption and also in clean conditions, materials that chasten contaminated air and water, materials which are competent and resource-saving while still granting high representation and much more.

Wisely evaluating the impact on the natural world within its cycle from resource group of objects to the throwing out stage is important in choosing ecological materials. Once this has been made clear, ecological materials can be used to create eco-products with a fine balance between working properly and eco-degree of effectiveness. Based on this idea, eco materials should meet the following six criteria:

- do not use few resources;

- have functions to conserve and clean the environment;

- create only low environmental impact when manufactured;

- do not contain hazardous substances;

- supply high performance when used;

- be simple to recycle (Eco products Directory, 2009).

In the next recourse we can read that Eco-materials qualify as those materials that enlarge the environmental betterment across the entire life cycle, while keep responsible efficiency. Eco-materials play a big role in material technology and science to minimize environmental influence, enlarge the recyclability of materials, and to also grow energy and material performance. In Europe, ecological materials are frequently called “environmentally-friendly materials” or “environmentally preferable” materials (Nguyen X.H., Honda T., Wang Y., and Yamamoto R, 2009).

Definition of Eco-materials in Lifetime Environmental impact of Buildings states that they are materials classified to their environmental and health influence, according to their performance and comfort based on the lowest overall cost (Mequignon. M, Haddou. H, 2009).

1.4. What is a differ between eco-material and conventional ?

The Japanese Profesor Koichi has several lectures about ecological materials. From his point of view, eco-material should include at least one site superior properties which conventional materials don't have.

- explanation of each better property of eco-material can be;

- reusability to use again product as similar function;

- structural infallibility to be used with good mechanical properties;

- energy saving ability to reduce all energy consumption;
- chemical stability without using chemical materials;
- recyclability to use product of material as a raw material;
- biological safety can be use to protect from negative effects to ecological system. Substitutability to be used as an alternative of "bad" materials;
- amenity to ensure the cosiness of working environment;
- ccleanability to separate, fix, remove and detoxify a pollutant for environmental cure process.

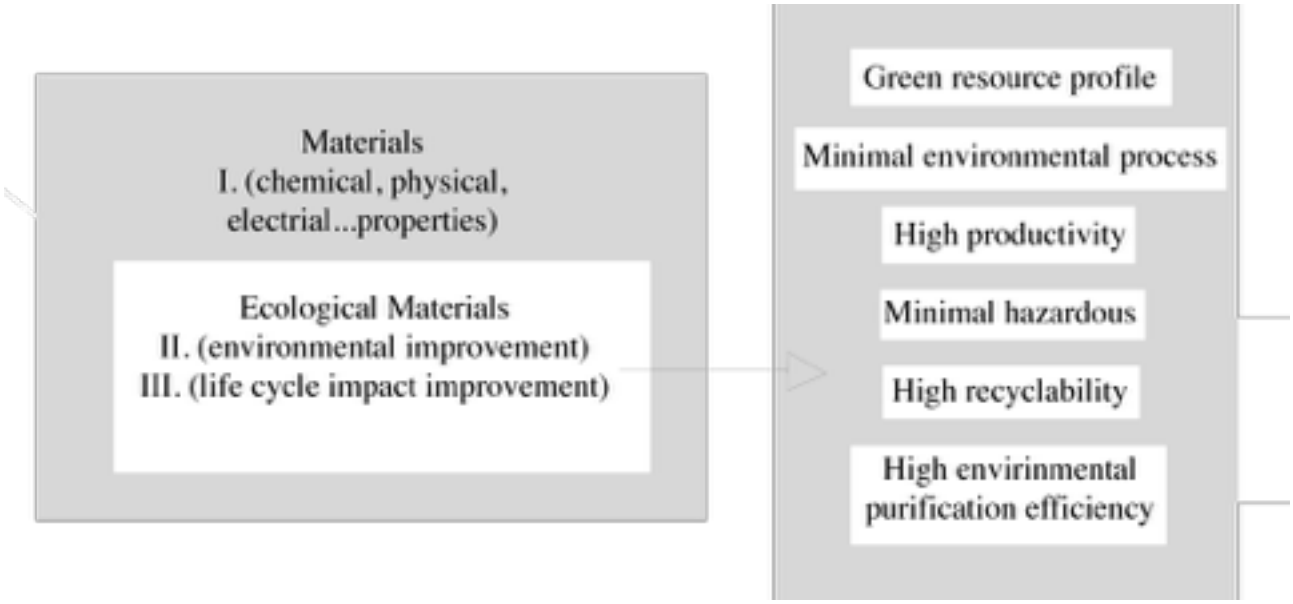


Fig. 1. What is a differ between eco-material and conventional (Nguyen X.H., Honda T., Wang Y., and Yamamoto R, 2009).

In effect, there is a large field of eco-materials expanded in different industries such as wood, iron, chemicals, paper, steel, electronics, construction, textile and polymers. Eco materials are the ones which can help reduce the environmental burden because of their life cycles. To summarize, all materials could be ecological but need to satisfy pre

requisites to improve an environment (Nguyen X.H., Honda T., Wang Y., and Yamamoto R, 2009).

1.5. Eco-material classification

Few specialist have tried to classify ecological materials from the point of view of a life cycle conception. The progress of eco-materials should be seen in the full context of sustainability. This classification method of eco-materials was lean on the 4 sustainable rules:

I. ”cyclic” materials;

II. materials for ecology and environmental protection;

III. materials for society and human health;

IV. materials for energy based on the two main criteria as their sources and functions.

These four major categories, after were classified further to 5 sub-categories (figure 2) (Nguyen X.H., Honda T., Wang Y., and Yamamoto R, 2009).

Sub- categories	Examples
Recycled Materials	Glass ceramic from wastes, recycled plastics, eco-cement, coal ash concrete, silica fertilizer, marine block
Renovable materials	Wood ceramics, wood based materials, biodegradable plastic made from vegetable base, soil ceramics
Materials for efficiency	Wasre reduction materials, pre-paint steel and alloy, wear resistant metals and alloys
Materials for reduce of environment load	Catalysts and biological membrane materials for fuel cells, carbon-fiber composites
Hazardous free materials	Lead-free solder, halogen flame retardant-free plastic, chromium-free steel, heavy metals free polyesters

Fig.2. Eco-material classification (Nguyen X.H., Honda T., Wang Y., and Yamamoto R, 2009).

Green resources profile

This aspect is about new resources and recycling stage. The question is whether "materials are from resources of green resource profile". Main issues to be discussed:

- reducing use of non-renewable resources;

This facet is connected to four life cycle stages including material production, product manufacturing, recycling and waste sale. The major question is if "materials are fabricated,disposed of and recycled through the process of low environmental impact" 7 main points for this feature are:

- reducing CO2 issue at material manufacturing processing;
- reducing emissions of pollutants at material producing process;
- progressive production efficiency;
- reducing energy and contribution materials at product manufacturing process;
- reducing energy and input materials at recycling process;
- reducing energy and input materials at waste sale stag;
- saving the landfill area.

Quantitative index for this facet could include the CO2, SOx, NOx emission, energy consumption, and material efficiency (Nguyen X.H., Honda T., Wang Y., and Yamamoto R, 2009).

High productivity

This phase is tied to the use stage of the whole lifecycle of materials. The main question is if “materials can exhibit high productivity in the applied product”. Major problems in this aspect are:

- reducing energy and share material at consumption stage;

- increase reuse and longevity of materials and products.

Quantitative indicators in this aspect could be energy and material productivity over the intake stage.

Minimal hazardous substances

This aspect is related to the material manufacturing, collection and recycling stages. The main question is if “material could reduce emission of hazardous chemical substances from the product and waste”. Major points are:

- reducing use of dangerous or potentially hazardous matter;

- establishing a collection system for hazardous chemical substances from used products.

Numerical indicators of this facet could be full amount of dangerous substances used and published in these life cycle stages. News of hazardous substances could be gain using a pollutant release and transfer register (PRTR) approach (Nguyen X.H., Honda T., Wang Y., and Yamamoto R, 2009).

High recyclability

This aspect is tied to the material production and recycling stages. The main question is if “material could contribute to efficiency recycling”. Issues in this aspect are as follows:

- growing relation of recycled resources;

- increase separation and recovery ability of other products;

- establishing a closed-loop recycling system;

- enhancing a open-loop recycling system.

Quantitative indicators for this aspect could be the attitude of recycled over natural material (Nguyen X.H., Honda T., Wang Y., and Yamamoto R, 2009).

High environmental treatment efficiency

This aspect is related to the intake stage. The main question is if "material can increase efficiency of environmental treatment or purification process". Major issues of this aspect are:

- clearing flying organic compounds (VOCs) or sick house syndrome organic mix in the living environment;

- removing dangerous substances in impure environment (air, water, and soil), Delating hazardous substances from expiratory gas (Nguyen X.H., Honda T., Wang Y., and Yamamoto R, 2009).

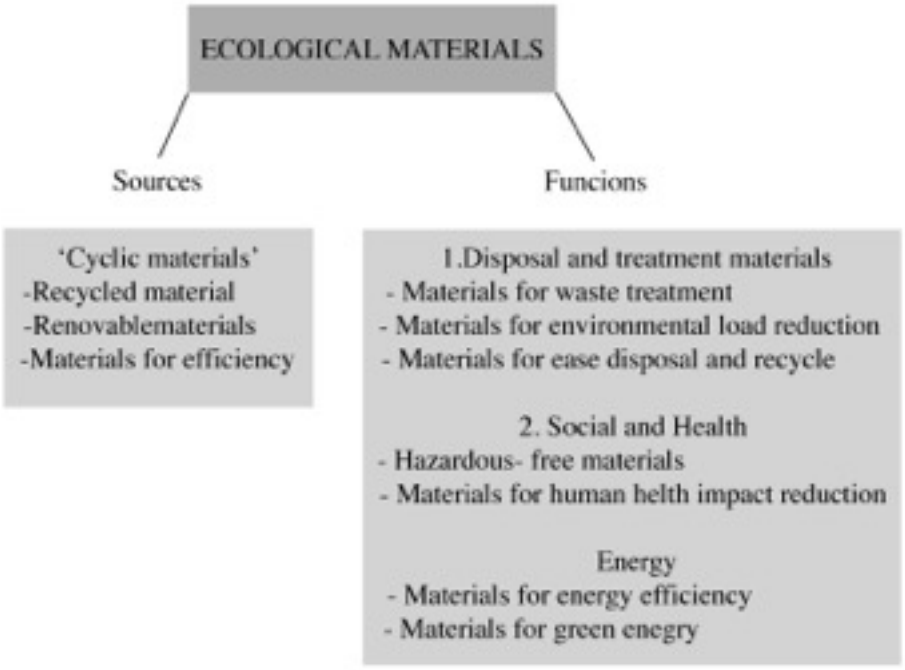


Fig 3. Ecological Materials Sources and functions (Nguyen X.H., Honda T., Wang Y., and Yamamoto R, 2009).

1.6. Design for Environmental Sustainability

The World Commission for Environment Development (WCDE) first time in 1987 introduced definition of sustainable development. Definition says : *Sustainable development is development that meets the needs of the present without compromising the ability of future generation to meet their own needs* (wced, 1987). It was more about well-being of people as an environmental quality then about environment. The main point was : the responsibility of present generation to future generation.

In ecology, sustainable development (from sustainable development and ability) is the demesne of biological systems to remain various and productive indefinitely. Long lived and healthy forests and wetlands are the good examples of sustainable biological systems. More usually, is the sustainability of systems and processes. The organizational law of sustainable development includes for interrelated areas: ecology, economics, politics and culture. Sustainable is base on sustainable evolution and ecological education.

Sustainable development can also be qualify as a socio-ecological process characterized by the pursuit of a common ideal. Ideal is by term unattainable in a given time and space. Moreover, due to the continuous and dynamic climb to it, this process leads to a sustainable system.

Healthy ecosystems and the environment are essential for the survival of people and other organisms. Ways to reduce the bad impact of people is environmentally friendly chemical engineering, environmental management and environmental protection. The information comes from green chemistry, earth sciences, environmental sciences and conservation biology. Ecological economics examines areas of research that aim at addressing human and natural ecosystems

Designers can learn many lessons based on behavioral change psychology: it is a challenge for many areas, from health and wellbeing to reducing fraud, as well as sustainability. Many sustainability projects try to change our attitudes towards products and services that convince or even make us behave "more balanced" by communicating certain messages and hoping that we will act differently. If only the public were more interested in the environment, we would change our behavior. So we are getting awareness campaigns that divide the population according to their relation to the environment and so on.

Designing for sustainable development can include both the physical material of a product and the way we use it. For some products, such as chairs, most environmental impacts occur during the earliest and last stage of the life cycle: extraction, processing, recovery and disposal of materials and transport.

An important feature of the idea of sustainable development is its multiplicity. It refers to a number of knowlage, including social and natural sciences. It has an integration character.

To balance the basic elements of the system that shape the future of human society on Earth, ie, the environment, society and economy so that the development of one element does not pose a threat to others (Vezzoli, C; Manzini.E, 2008).

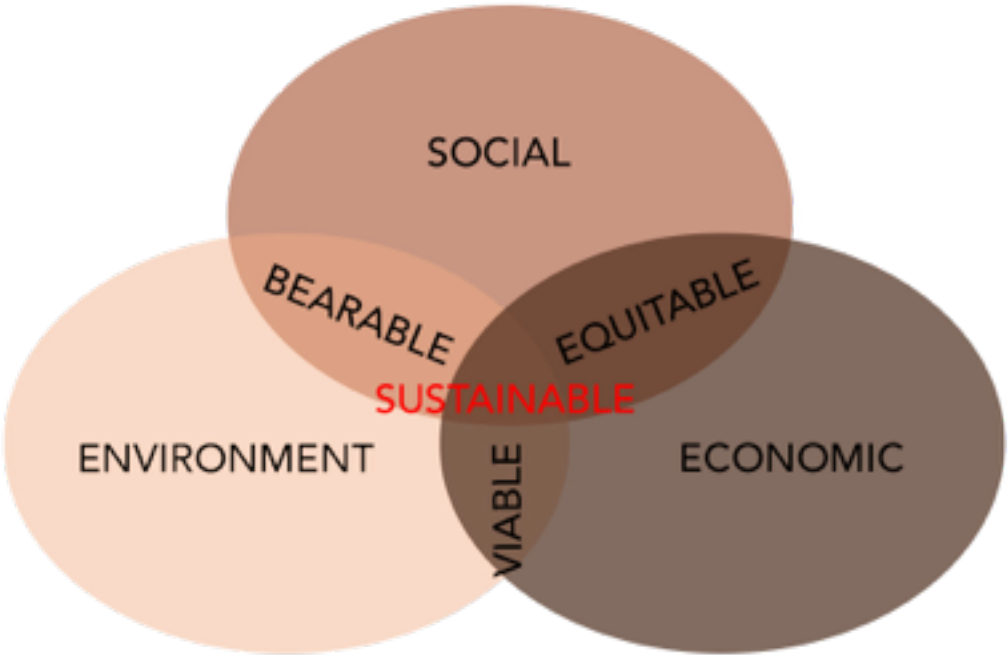


Fig 4. Designing for sustainable development (www.environmentalsustainable.con, 2017).

2. Recycling

Global Recycling Network defines recycling as a 'Process by which materials that would otherwise become solid waste are collected, separated or processed and returned to the economic mainstream to be reused in the form of raw materials or finished goods." It means that recycling change wastes into the resources. There are many benefits from this process, such as environmental, economical or social. Recycling is mostly associated with materials like wood, metal, glass, plastics, and paper, but can be also applied to water (Pratima. B, 2014).

2.1. Markets for recycled materials

The market is one of the most important aspects, which we have to take in consideration, to decide if a recycling process in economically viable. Indeed, on the market, there are a lot of influential indicators, and the prices depend on the trend and fluctuate very strong over time. The situation on the market and the prices are playing a huge role when it comes to choosing the best treatment process in the safe context. The recycling process depends vastly on the efficiency and effectiveness of the former and later processes needed. For instance, of such processes are set of waste, transport, separation, conditioning, and also post-cure which are needed for the transformation of the received product to a marketable. Of course, another aspect that should be taken in to view is the recycled material price on the market. For example, plastic waste, the selling price of the recycled matter depends very on the price of virgin polymer, which is connected to the crude oil price as well as the electricity cost. On the other hand, prices of plastic waste bought by people who recycle them are seldom influenced by the oil price and financial gain influences it more than environmental celebrate.

Wood

With respect to recycling of wood, it is necessary to favor two types of materials. I) wood of high performance descends from clean white coniferous wood, wooden palettes, the sections of wood, wrappings and carpenter's scraps. They ought to be free from paint and covers. II) wood of a low quality encompasses plywood, door and frames window, roof wood, panel products and so on. Both kinds of materials descend

from construction and demolition, commercial and industrial sources, houses. The principal market of wood from recycling was the industry of panel plates from historical causes. This material is applied in the production of particle board. Nevertheless, tree section looked for the markets of value-added, but the new uses became open, i.e. The ponds of situations, markets of garden furniture constantly develop. The fact this caused, that tree industry grew up in recent years. It is expected, that application on tree equipment will grow because government promotes the production of energy from these sources. It is possible to observe the evolution of prices recovered wood of mixed supplied to recycling of wood. The negative prices show that recycling is paid for these materials. Nevertheless, this fact can be changed considering growing application on the clean palettes of wood and sawmill round wood in the direction of small carried out payments by the deliverers. Moreover, the price of tree scraps will differ considerably depending on the cleanness of material, volumes, and location.

Paper

Production of paper has big effects on the environment. The use and processing of raw materials have many negative impacts on it. There are technologies which can moderate this bad effects and give a positive economic impact. Natural resources should be protected from manufacturing processes inputs and then the amount of harmful mixture trickle to the environment would drop on side of the production process efficiency. Paper production from recycled fibres consumes less energy, decreases air pollution and conserves natural wood. Nowadays, recycling paper production and its use are established and popular all over the world. The new technologies are able to produce many types and different qualities of paper just using wastepaper as a raw material. Recycling paper is much better for the environmental then a normal virgin paper. It helps to keep forests in better conditions and not make huge damage to woods. It saves resources and creates less pollution through manufacturing since the fibers have previously been processed once. Also it reduces solid waste, because it turn usable paper from the loss flush. What is important is that recycling paper lowers the number of trees that are cut down to make a paper and is likely to reduce general demand for wood. Moreover, using this paper, we can save forests. By replacing used paper for trees, recycling whittle the overall strain of forest management required to meet a given request for paper, and the push to convent native forests and

ecologically delicate areas like wetlands into tree plantations. With recycling, trees which are harvested could be fabricated exert methods that had a lower impact on the environment. Thus, recycling support keeps the whole range of values that forests ecosystem supply, including pure water, biodiversity, and wildlife habitat. Every tonne of recycled fiber can supplant a tonne of virgin fiber score in the following reductions in use :

- wood 100 %
- energy consumption 27%
- wastewater 33%
- air particulate emissions 28%
- solid waste 54 % (Yrjo.V; Nilsson.S, 1993) (Pratima.B, 2014).

Metals

Metals are materials with many attributes. For instance, lead is a flexible material which can be shaped into different forms, steels are strong and long-lived. It means that metals are very useful and easy to recycle and it is hard to replace them. To make a new shape of metal, it has to be heated to a melting point. It's important that this material can be recycled over and over again, and it won't lose its qualities. There are some metals that it is possible not to take ore from the ground. Valuable materials which could be recycled are steel, aluminum, lead, copper, tin, gold, silver, zinc, and platinum. Today, nearly 45% of steel and about 40% of copper are from recycled sources. But there are some metals which could be recycled by specific processors. For instance, platinum or gold could be recovered from old electronic equipment like computers, but the process is hazardous and complex to health because these metals are harmful if they are inhaled or if they are absorbed into the skin. But there are many benefits of recycling metals. Not to have to excerpt ores from the land, there could be few quarries which produce a lot of waste soil and rock. Frequently this soil is covered in piles around a stone-pit, creating powder and traffic problems, and using fuel. Recycling means few quarries and lower air pollution. The most popular recycled metal is aluminum. It is shiny, lightweight, strong, malleable metal which can be rolled thin. It is

great to make folding chairs, drink cans, aerosols, and ladders. Nowadays, 18 million tons of refined aluminum is produced. Aluminum is a very valuable metal. They are many organizations all over the world which teach children to collect cans and then sell them to make other things of them. The leader in recycling aluminum is Brazil, they exchange aluminum cans for items like electronic equipment, furniture, school kits or breakfast boxes. This process requires much less energy than aluminum metal from bauxite (Bauxite - is the world's main source of aluminum).

Because of recycling, it is possible to save money on transportation and it is better for air pollution and quarrying. Recycling one kilogram of aluminum saves up to eight kilograms of bauxite, four kilograms of chemical products and fourteen kilowatt-hours of electricity compared with normal form. Over 400 million tons of metal is recycled every year. It saves a lot of energy and it reduces air pollution by 86% and water pollution to 76% (Sally Morgan, 2009) (Think green Recycyling, 2013).

Glass

Glass is a heavy material, transparent or translucent. It is made from a liquid mix of sand, soda ash and limestone. Glass is used in electric bulbs, window panels or can be used in constructions of buildings. The same as recycling metals or plastic, recycling glass has many benefits to the environment by saving energy, lowering emissions and reducing landfill and quarrying. Glass is a 100% recyclable material and can be reused many times. Recycling of glass saves 18% of the energy which is needed to make new glass, or the equivalent of 860 kilowatt-hours of electricity. The energy saved from only one recycled bottle glass could light a 100-watt bulb for four hours. Recycling of glass creates 20% less air pollution and 50% less water pollution. Recycling glass is used in producing new bottles and jars. It cuts the request for raw materials. Using a ton of recycled glass keeps 1.2 tons of raw materials. They are few types of glass which can not be recycled such as window glass, car windshields, mirrors, Pyrex, ceramics, dishes, or crystalware (Think green Recycyling, 2013).

Plastics and textiles materials

Plastics is a material which is around us, is very versatile and vast quantities of it are manufactures every year. It is lightweight, long-lasting, flexible but very strong and

can be very clear so it is possible to see the contents. It is a very useful material, but many plastic things end up in landfill sites once they are thrown away. The weight is not big but it may take hundreds of years for them to break down for good. Nearly 26% of plastics things are recycled in Europe. They are many uses in different sectors and the use of it is permanently growing (starting with packaging, structures to telecommunications and electronic equipment). Plastics recycling minimizes the quantity of energy and natural resources (such as water, petroleum and other natural resources) which are needed to make virgin plastic. Recycling one ton of used plastic saves 7.4 cubic yards of landfill place. What it means is that a lot of plastic ends up right into the environment, breaking down into small pieces, polluting the soil and water.

2.2.The recycling supply chain

Before recycling, the recovered scraps must be gathered, transported and separated among others by processes in result the general process of recycling will depend in great measure on the effectiveness and efficiency of these "small" processes. Similarly, from economic perspective, the process of recycling must be preceded also from effective and economic sub-processes. The otherwise high costs of recycling could excessively lower advantages for connected environment with recycling. Besides process of necessary recycling, there is the broader approach including earlier and back stages of recycling.

Collection

The municipal created waste in the European Union carried out 514 kg on the inhabitant (Eurostat, 2010) and 719 kg in THE USA (EPA, 2010) into the 2009 year. The so large quantity ought to be treated in the most convenient processes. The end of the life of materials begins everywhere there, where it is produced, it is independent of whether being produced in the houses, shops or industry. Necessary is a separateness of scraps in the appropriate fractions depending on the objects, in which they will be surrendered to processing for the purpose of the registration of more distant stages more effective. The scraps are treated easily in this all activity, but economic costs are reduced, that enables recycling the competitive treatment. In the ideal case the scraps they ought to be undressed as paperboard, plastic, metals, glass, wood, batteries, textiles

and ecological. Possible - to make at the source, selectively gathering in the cities or in the concrete institutions sorting, where all materials being suitable for recycling they are sorted and sold to recyclers. Nevertheless, the availability of these facilities varies from country to country and is closely related to environmental policies. Nevertheless, the accessibility of these equipment differs depending on the country and is closely connected with politics of environmental protection. Transport a the period of gathering. It is possible to benefit from a broad scale of vehicles, but truck fixed itself most used in this question considering their load and the specificity of cities. Moreover, these vehicles can at times contain the individual pre waste of scraps, which enables compacting waste, what make them more effectively the accumulation.

Sorting

After the meeting of scraps, the classification is an obligatory activity for the purpose of the separateness of different materials being suitable to recycling and the avoidance of undesirable materials which they can decrease the output of recycling and the quality of surrendered materials recycling. For example, ceramics are considered as the unprofitable material, when glass is surrendered to recycling. Moreover, the separateness of material in the concrete fractions (for example different colors and the like.) Enables the utilization of the differences in the prices of sale, how earlier proven in researched the elements. The costs of paper and cartoon differ from the quality of fibers, but at the same time from the origin. The plastic they ought to be distributed depending on the kind of resin because some processes of recycling are specific for each material. For example metabolize acts only with the polymer PET . Glass has required it ugh sorting according to it its color. Colored glass is unable it produce clear they and mixed glass present the lower price. The cost of sorting depends on the technique selected. For instance, in case of using optical dividers, the purchasing cost of the equipment could be much more costly than carrying out and density separator, i.e. and pool with water and of salt (it growth the density) or alcohol (to whittle it) is enough for separating plastics. However, the last cure could drive it a profit in the final cost in order to consider to the price of energy required to dry wastes as well as the substances used for adjusting the water density and the water treatment after the processing. Next, we have two flows: materials which will be continuing the process of

the recycling and sorted materials which it is possible to sell in order to obtain the income.

Recycling process

The process of recycling differs depending on the material. Recovered paper is put to a pulp with water and is pulped mechanically and hydraulically, for the purpose of the diffusion of paper in the fibers. At that times certain substances are used such as NaOH and other chemicals. Contaminants are distant during the work considering the differences of physical properties. The suspension of cellulose mass is pumped in from pulp to hydrocyclone. The organic repulses they are often made a fire for the purpose of the utilization of their combustible values. Generally speaking, sifting with the lower consistency for the purpose of the separateness of undesirable particles is more efficient, but requires additional mechanical installations and the expenditures of energy in the process are increased. Then is applied fraction for the purpose of the separateness of fibrous mass in two fractions, creating the stream of short fiber and fiber long catenary, in order to apply different measures. In the event of long fibers, the dispersion can appear together with the end of the scoring of better binding unions the fiber- fiber, durability characterizations and the decreases of the size of dirty spots. Moreover refineries they put straight optical properties and durability, but the principal fault is the impressive expenditure of energy. Continuing the process of recycling of industrial paper, the mixture feeds paper to the machine after a cleaned basis and small sifting. What is more, during recycling of paper, a flotation deinking is important in order for the ink it to become superseded and brightened. Additionally, before the entry to the storage tower, it is possible to add bleaching substances. At last, the quantity of wastewater in the process should be conveniently surrendered to processing for the purpose of the decrease of pollution.

The Process of Recycling Plastic? All countries all over the world need to create a more sustainable future and people more conscious of the need to whittle and reuse, as plastic recycling is transported out on a bigger scale than ever before. The process includes the following:

1. Recycled materials are collected from homeland companies by recycling systems or from recycling facilities.

2. Plastics are sorted with other printing materials using advanced machines.

3. Plastic materials are recyclable in different groups.

4. Any plastic types that are not available are recycled and disposed of in the storage area.

5. Plastics are crushed in bales that are cast into a plastic recycling facility.

6. At the recycling plant, the plastic is cleaned with resins such as food waste, ink, and labels.

7. Plastics are ground in flakes or debris, which then undergo the washing and sorting process again.

8. Flakes and strips are chemically cleaned and then melted to form plastic beads.

9. Flakes and balls are sent to a plastic factory to be melted again and then for processing into new products.

The process of recycling of metals consists of a process of melting. Temperature ought to be set at hundreds to thousand degrees, but alloys can diminish such high value, the high energy costs to more reasonable. Special features exist n the process of fusion, considering the wide range being suitable for recycling of metals and the stages of the overcoming of potential problems. For instance, as for melts of aluminum, it is necessary to degas it for the purpose of the decrease of the quantities of hydrogen in the liquid metal. Continuing the process, the melted metal is poured into forms. When metal becomes solidified, it becomes superseded by the form. At the end, the material is properly cut. This metal must be again remelted to reduce its expansion and lower its cost. Next, cleaning of the surface is needed. Usually, sand or other forms can adhere to the moulage and metal is cleaned in process of clashing. In other words, the center of granulations is rounded up on the surface of moulage. At last, grinding, polishing or sanding takes place for the purpose of the achievement of much-desired dimension exactitudes, physical shape and the finish of surface, but also painting for the purpose of the prevention of corrosion and the improvements of visual attractivenesses.

The next principal step is melting in the process of recycling of glass. Balls are drowned in the huge furnaces. Decolorizing and dying is a succeeding stage. In the first place, oxygenation of a melted glass is required. In the event of a green glass, color is changed from the green to a yellow-green and manganese oxide is mixed until the gray color appears. To bronze it, zinc oxide is added to glass for the purpose of oxidizing it into a blue or green ball. If clean glass descending from recycling is required, erbium oxide and manganese oxide are added for the purpose of clearing all colors from cullet glass. Finally, glass from recycling is formed into a final product. Taking under consideration the fact that pollution became removed before, the process of recycling of wood consists from a two-stage process, in which wood is introduced to the bowl to the polishing, horizontal polishing machines or shredder of wood. Wood is ground into chips, which are ready for sale as particle board, chipboard, cellulose-paper article, mulch, biomass, and compost. In the industry of cardboard plates, gluing the little pieces of wood is necessary.

Distribution of recycled material

After the whole process of recycling, it important to pack and transport it safely. Packing depends on the material, for example, paper is carried in coils, pallets form plastic mostly in sacks, metal and cardboard need strapped sheets to be transported. With glass, it is a little bit different. Recycling glass is made in the same facilities that's why transportation is not necessary for this step, only from the factory to the final buyer. The cost of recycled products decents by way of transportation, distance, and weight of the product.

The recycling supply chain

The recovered scraps before their recycling must be gathered, transported and separated from others by processes in result the general process of recycling will depend in great measure on the efficiency of these "small" processes. Similarly, from an economic perspective, the process of recycling must be preceded also by effective and economic sub-processes. The otherwise high costs of recycling could excessively lower advantages for connecting the environment with recycling. Besides the process of necessary recycling, there is the broader approach that includes earlier and back stages of recycling.

2.3.Economic evaluation of recycling

On the one hand, we need to take into consideration the economic results of recycling and on the other, we need to identify the weak or less effective stages of the process in order for it to improve. Such data is valuable from the perspective of both private and public decision making. With respect to a State, it permits to elect the best alternative for the transformation of wastes. Private firms deliver information on the profitability of the processes of regeneration and recycling. Manufacture and work costs in underdeveloped countries are lower than in Western countries, but the inaccessibility to raw materials can invert into a lower benefits item in the global market. Looking at the to statistics, expanded countries make more waste quantities per person, but high-populated emerging lands like China could change this trend. Still, recycling constitutes not only a challenge, in an environmental context, but also a good opportunity to gain from it. Rather than purely virgin materials, we could use mixes of recycled and virgin materials to create clothing and other products. Indeed, there are many studies which show us that the ratio of some sum of recycled material to virgin does not impair the features and characteristics of the resulting material. It means, there are matters where recycling could not be the good way to deal with waste For instance, when the value of the recycled material is extremely priced with the consideration of the pure material, it could be more payable to choose the recycling option. On the reverse, in the case where the recycled material is little-priced, it would be more profitable to focus on waste to the energy technologies and get profit from the sale of energy. On the other side, recycling would have important economic impacts as it exchange materials usually receives, transported and manufactured outside on with materials collected and processed commonly within the area. Then, the choice of the improvement process that carries on best in a given context needs a multi-perspective access including problem such as financial cost, environment, market, supply, demand, etc.

2.4.Environmental impact

Recycling is good for the environment, in that sense we use old and waste that are not useful and then turn them back into a new product. Because of it, we save resources and send less waste to landfills, what helps reduce air and water pollution. Energy saving is important if we want to reduce the future effects of global warming. If

we recycle one aluminum can, we can save enough energy to run the TV for few hours. This obviously depends on the energy consumption of the TV, but it gives a great idea of how much energy can be saved during the recycling process of the products.

Recycling serves two purposes. First of all, waste disposal is avoided and helps to reduce water and air pollution and on the other hand, valuable materials such as cans, plastic, aluminum, and glass are reused in other forms rather than wasted. Be aware of what you are doing, pay attention to the things you buy, and always check if you really need it, or if it's less waste. We can all do our part and make a huge difference(Yrjo.V; Nilsson.S, 1993) (Pratima.B, 2014).

3. Wood environmentally friendly material

To make good interior design and, at the same time, not to harm the environment, we have to pay attention to the materials from which the furniture and other things needed at home are made . There are many possibilities. We have many materials, like plastic, metal, glass and finally wood. According to WWF, estimates, 86 percent of people have declared that they buy wood from sustainable ecological forest holdings or wood products. Wood is an organic material, a natural combination of cellulose fibers (that are strong in tension) embedded in a matrix that resists compression. The principal components in wood are cellulose (40–50%) and hemicellulose (15–25%), with lignin (15–30%) as well as other material such as sugar, starch and protein. The technical quality of wood are highly relative on the type and humidity content. It also includes changing other elements depending on the type, which qualify its smell, color and tolerance to pest damage. There are two forms of wood, softwood and hardwood, which are subdivided into a number of different types. Wood is one of the most famous ecological raw materials for interiors. Trees can be planted again and the wood obtains can be processed without harm to environment and bad additives (Howes.P, 2012) (Lefteris, 2005).

3.1. Harvesting Methods

Contemporary concept of forest management poses a positive motivation to undertake research work on developing ways of maintaining balance between inevitable human interference in the forest environment and the possibility of natural development of this environment. Harvesting of wood causes severe disturbances in forest ecosystems, often with very strong environmental stresses. The new approach to forest management takes the utmost account of the maximum protection of the forest ecosystem and therefore obliges the use of environmentally friendly technologies to minimize the damage to remaining forest components, particularly soil and trees (Wohlleben.P, 2016).

Hand tools for harvesting wood

Forestry axes: These are the tools for the manual level of wood harvesting techniques. They also include hand tools on the hand-machine level of logging. There are various types of forestry axes, designed for felling, picking, splitting, or universal purposes. Each ax consists of a proper ax, a wedge-shaped, steel cutting tool with a semi-circular blade, and a hole in the part called obtuse and ax.

Hand saws: With the current possibilities of using high-performance, in various assortment of saw blade motor is difficult to find a use of hand saws. However, their use may be justified for early cleaning and late cleaning. The use of saws and hacksaws could achieve the performance comparable to the work of saws.

Ancillary tools for felling and lumbering are:

- wedges: when harvesting wood at the level of the hand-machine to the principal repairs, as we know, serves chainsaws with internal combustion engines. However, there is a large group of hand tools and auxiliary equipment. Ancillary equipment for felling trees can be divided into three categories;

- the equipment that is usually used in the case of a fire;

- equipment, the toothpick is taken to the framework and used only when needed;.

- the equipment that is on the canopy of a forest hut (shelter).

Levers and directional poles for overthrowing trees. Levers for dropping trees consist of a metal drum at the top end of the handle covered with plastic or rubber and at the bottom of the steel foot in a plate-shaped, plate fastened to an angle of 150 degrees from the lever. A yoke with a hook is often placed on the lever, which makes it possible to use it as a rotator for thinner trees. The directional poles, in turn, serve to confer the direction of shelling of trees. Wooden poles have a length of 2-6m, fixed length or folded with a metal hook. Directional poles affect the trunk of the tree directly by the force of the woodcutter muscles.

Tools for turning and chasing trees and assortments used, while cutting a tree, the two crowns are wedged together. Caps: Steel bird-shaped blade, rope hoists: crane or drum hoist, rope rollers: to change the direction of the rope and there are tree trunk protectors. 9 (Wood Harvesting with Hand Tools - An Illustrated Training Manual (ILO, 1989)) (Sztyber, 2007).

Portable saws

Hand-mechanical level of harvesting techniques and other forestry work is based on tools in which the basic working movement is driven by the engine and the auxiliary motions and control of the tool are performed manually. Like every machine tool, it consists of three assemblies: the engine, the power unit and the work unit. The engine delivers power tools, the drive unit transmits movement from the engine to the work unit via various transmissions (mechanical, hydraulic and other) and the work unit directly affects the workpiece.

The main advantages of hand-mechanic tools are the greater productivity of work compared to the productivity of manual tools, the considerable reduction of human effort - with the use of small initial capital expenditures. Only one single-cycle, unleaded gasoline engines for unleaded petrol are used almost exclusively. Extremely high levels (on handling depots and wood compositions) are used with single-phase AC motors of 50Hz and 230V.

Due to the design and purpose of the machine tool manual can be divided into 3 groups:

- basic - sawing machines, parafinators
- tools based on sawing machines (ie sawing machines with suspended tools without changing the construction of saws) - cutters, mechanical or hydraulic breakers for collapsing, lifts;
- tools based on saw engines - mechanical grubbers, wood bits, metal and soil bits, snow scrapers, water pumps, winches (Sztyber, 2007).

tool name	application tool	type of cutting device
Sawing machines,	Timber harvesting, construction and agricultural work related to the felling of trees	chainsaw
Lathes, submersible machines	Umbrella trees overgrown and raised standing	Chain saw, circular saw
Cutter	Crop cleaning, cleaning the area under cultivation	Circular saw, chain saw
Hydraulic wedges and jacks	Overthrowing trees at the scene	Wedge, lift
Mechanical diggers	Punishing shot and rollers	cutter
Mechanical drill bits	Drilling holes in wood	drill
Snow shovelers	Cleaning pavements and work stations before the cut	blower
Mechanical pumps	Filling tanks, sprinkler water supply	pump
Mechanical drum winches	Moving loads	Cable drum

Fig 5. The basic use of hand tools (Sztyber, 2007).

The requirements for these tools can be divided into general, operational, and occupational hygiene and safety. General requirements include: minimum weight in working condition, low price, unification of assemblies and spare parts, construction content, meeting the requirements of industrial aesthetics. Performance requirements include high performance, reliability and durability, economy of use, versatility, ease of use and repair, ease of commissioning, handling convenience.

Technique and technology of machine harvesting

Operations of the technological process of harvesting can be divided into working and transport. As a result of work operations (tree twigs, pruning, cuttings of sorts), the shape and dimensions of the work piece change, as a result of transport operations (tree felling, felling, trimming and sorting into packages, stacks, Skidders, timber exports,

etc). Transport operations can be divided into two groups: closely related to work and non-work related operations.

Machines used in machine harvesting can be divided into single and multi-operational. The first of these include, for example, chopping machines (cutters), mobile skimmers, skiders, rabbits and wood splitters. Multifunctional machines perform at most two operations (one for work and one for transport). Machines for several machining operations (knife-makers and tree trunks or their barking) are called processors. The most specialized are multi-operative machines called harvests. They perform all framework operations (cuttings, pruning, cutting and laying). Shredding machines are only self-propelled or mounted on tractors. Machines performing other operations are self-propelled, mobile or stationary. The harvesting machines can be divided into narrow range machines and wide range. The working width of the machine is an important technological parameter of machines, which affects the technological process, the damage to the pod and the pods.

They can also be divided into three types:

Manipulator - is a device for manipulation, that is to say, move, etc., used in mechanized work. We distinguish two types of such machines: single lever, double lever.

Front-end machines are usually narrower. For example, tractors with fender heads hanging from the front or rear. It is used where the wide range machines are too large

The side-mounted machines have a working device (cutter head) on the side, which enables them to carry out frame work on the edge of the stand, which declares the appropriate logging technology (Sztyber, 2007) (Bajkowski, 2007).

3.2. Wood and the environment

LCA (Life Cycle Assessment, LCA) is an instrument that we use to illustrate the potential effect of a product, material, process or action on the environment. LCA is not a hard to use method for estimating an issue of environmental influence across the whole life cycle of a product system, from receiving materials through manufacture, use

and final sale. The LCA score helps promote reliable design and redesign of products and the processes, leading to reducing general environmental effect and the exert and release of more toxic materials. LCA search recognize key materials and processes in the whole life cycle of the products that could have the best impact, including impact on people, health and society. These rates let companies make product correction using environmentally friendly, materials, processes and design options.

In life cycle estimate, the research reflects the environmental impact of materials trough their life cycle, from raw material drawing, through manufacturing, transport, installation, use, conservation and sale or recycling. The studies systemically show that wood better for the environment than steel or concrete in meaning of energy, air and water emissions and greenhouse gas emissions. The wood ingenuity cuts losses in a similar way to optimize the work of the sawmill and to utilize the chips and sawdust for the manufacturing of paper products and composites or as fuel for bioenergy.

Products from wood aim to have less personify energy, are reliable for lessening air and water pollution, and have a more light carbon footprint than other commonly used materials. Forest certification covers forest administration trial and the balance of environmental, public and economic worth, Environmental Product Declarations (EPDs) provide information on environmental impact. Forests products play a role in averting climate changing and minimizing greenhouse gas emissions. When we use wood products that store carbon, the management of forests is also responsible in a way that they balance harvesting and replanting, what could minimize our carbon footprint in the long run. Next, wooden buildings may need less energy to build and operate during the process. The optimization of the project, of using recovered wood and the decision that waste from the workplace are separated and transferred to the regional improvement center are all ways to reduce, reuse and recycle.

Moreover, humans can tend to be more attracted to natural materials, and there are prooves that imply that this could contribute to people's sense of well-being. (Rethiingwood ,2012).

Circular economy - a regenerative economic system that minimizes using of raw materials and spoil also energy emissions and losses, initiate a locked knot of processes during waste from one process is used as raw materials and for others, post production

waste. This kind of model is the opposite of a linear economy based on continuous growth and increasing consumption of raw materials and waste. The idea was living for many years and has stay an increasingly famous term in the area of sustainable evolution, waste management and the economy.

A circular economy is a conception that imposes that growth and welfare is separated from the use of natural resources and the reduction of ecosystems. To elude throwing away products, ingredients and materials rather then of targeting the rule value bonds, we could set up a community with a healthy economy that is inspired and sustainable with nature (www.lca.com , 2017) .

Wood's environmental advantages

- wood is a 100% removable material (material for inspirational design wood)
- it does not naturally produce any kid of toxic in transformation from tree to product (material for inspirational design wood);
- trees have the longest life time (were before people appear and will be here long after we are gone);
- wood has the lowest energy consumption ;
- wood had the lowest C02 emission;
- wood products support forestry to enlarge, progressive the carbon sink result and reducing the CO2 in the atmosphere;
- because wood is made by photosynthesis, is a good solar energy keeper, Even at the end of wood product life is possible to produce energy, as a replace for fossil fuels;
- wood is a biodegradable product;
- one mature tree engross more or less 13 pounds of carbon dioxide per year;
- big trees around the house can reduce air-conditioning costs by 10 to 50%;
- energy consummation from, harvesting, transport,convert to recycle wood is less than other materials, around 75% of the energy used for wood production is fabricated from rest wood and extractive wood;
- using wood is leading to forest biome protection, because trader promote sustainable wood market and timber products from good managed forest;

- houses made from wood consume less fuel as the timber is an isolator, engrossing and slowly remove the heat produced by the energy creative under-floor heating system, so the boiler is used for much shorter terms, which is better for environment;
- carbon dioxide (CO2) is taken from the air and worm by trees to rise. When these trees died or are burned, this CO2 is given back to the atmosphere;
- a hardwood floor subfloor supply thermal insulation;
- any kids of wood include a bit of water in common use, and the dry wood can even absorb moisture from air around it. Wood in a tree which is living, and contains more water than wood in use;
- some paint products can be made from chemicals produced made by pine trees;
- big wooden beams are more proof to fall during a fire than uninsulated steel beams of similar strength. A layer of char forms on wooden beams which insulates the inside, very slowly strength reduction;
- trees grown under similar conditions of temperature, humidity and soil moisture availability, all have the same basic characteristics;
- wood can keep hygroscopic balance with the environment, because of porous structure;
- is a good acoustic insulator, rely to the chemical composition in lignin and cellulose that absorb energy of acoustic waves, with reduction of acoustic pollution and other phenomenon as reverberation;
- good resistance against from fire than other materials because of the low thermal conductivity;
- wood products produce less air pollution;
- wood products produce less water pollution; (Krishna K. Pandey, V Ra,akantha Shakti S. Chauhan, A.N.Arun Kumar, 2017,) (Lefteris, 2005)(Ballard.V, Rand. P, 2006) (Prof. Dr. Ramazan , 2017) (Jennifer O'CONNOR,M, 2004).

3.3.The psychological impact of wood

The environment, where we live, have a big influent for our lives. It affect people physically and psychologically. To establish the physical health effects. How do material which we are using in our homes, with effect on our mental well-being? There

is some materials, which are better , more beneficial from others in terms of how people emotionally conform with them ? This research is to establish , if increased psychological well-being could be achieved from wood in the interior design use.

It means that the materials in our surrounding which we use have a big effect on how we notice and see our area and how are their affect to us. By progressive knowledge about the goods of the environment on our health and comfort, it is easier to design houses that gives these benefits. The use of some materials in interior can help to create relaxing, healthy homes which are propitious to a feeling of well- being. Research about environmental impact to the people psychological health, points that, humans prefer natural landscape then artificial scene. This preference to be closer to the nature and use natural materials can lead to raised and supply of well-being to the people. Much of the research about the nature and positive psychological benefits rotate around plants and their ability to reduce stress. Wood like a natural occurring material is not only a beautiful element is can also cooperate to people's well-being within an interior space. Wood seem to call feelings of "harmony," "simplicity," "balance" "warm" and "calming," in people that administer to the general appeal of wood. The investigation about psychological effect of wood used in interior design is a grow and big unexplored area of studies (Gadish.T, 2001) (Rice.J; Canada.F; Kozak.R;Meitner.M.J, Cohen.D.H, 2006).

Healthy house, healthy live

A new trend is growing up in the world, 'healthy homes' are making of concern for environment and people health. Healthy housing presents an climb to the construction, renovation, and action of homes that is a center of the health for people, and also the environment. Nowadays people are paying more attention to the effects that their houses can give on their health. In designing a house, ascetic aspects are important, but in order to improve psychological well-being, its infancy play key role.. Science Research is showing strong connection between health and housing. For people, house is not only a building , it is an interdependent system, which is made up of some parts like, structure, lighting, acoustic and also air quality. A framework for health house is, consideration of environmental sustainability, original design, and also occupant's health. A research of this shows health occupation includes air quality, water, lighting,

acoustic and materials used indoor. The World Health Organization describe health as ''a state of complete physical, mental, and social well- being and not merely the absence of disease or infirmity" . How people deal with environments has an affect on their stress level, well-being, and health in general meaning. The architecture and neurology are converging in the study about how people notice their built area, and what is an influence to their behavior. Neuroscientists conjecture that our behavior is affected by a different of impulses, including our built surrounding, and this is an operation which can take over the track of our lifetimes. Samples of this connection between architecture and psychology are becoming more often large, with hospitals, now being designed to maximize the use of wood and natural light in book to set up more "therapeutic" areas for discover patients (Rice.J, Canada.F, Kozak.R, Meitner.M.J, Cohen.D.H, 2006).

3.4. Wood disadvantages

Wood is a living organism and because of that, have some drawbacks. It is very sensitive for environmental conditions and wood pests. Processed wood has structural weaknesses and sensitivities that are not found in other materials. Wooden materials without good protection are easily destroyed and damaged by such factors as:

Water - Variable humidity conditions lead to splashing and cracking of wood

temperature - acts like water, high temperature and humidity promotes infections and molds, while when it is hot and dry - the wood is very dry and can crack, and the wood is flammable;

insects - Termites, carpenter bees, carpenter ants, powder post beetles and wood-devouring fungi are all common wood-destroying pests. Pests are difficult to identify, costly to exterminate, and can do great amounts of damage that is almost invisible until it's too late to repair.

fungi and molds - develop very quickly on wooden materials, conducive to their long-lasting high humidity and high temperature.

It is worth pointing out that all the above problems can be eliminated by using appropriate wood prepares against parasites and changing weather conditions. The second major disadvantage is its lack of homogeneity in terms of construction. Wood has innate and acquired qualities, anomalies, defects. In addition, it is susceptible to damage by insects and fungi that significantly reduce its mechanical strength. All these

factors lower the value of wood and significantly reduce its usefulness. The wood should have a uniform distribution of the grain and the course of the fibers parallel to the longitudinal axis. Wood elements should not have knots, cracks, damage caused by parasites, discoloration and rotten fragments. Only materials free of these characteristics should be used as natural good material (Lefteris, 2005) (Kimber.R, 2011).

3.5. What to do to extend the durability of wood ?

Every kind of material, especially natural origin, over time is degraded (biotic and abiotic). The speed of this process depends mainly on the type of material and the conditions how was used. Even impregnated wood can be exposed. To extend the durability of wood, it is often to use chemical impregnation. Conventional wood protection methods are biocidal impregnation, wide spectrum of action, protecting them from fungal decay, insect attack and microorganisms. Many wood protectors which were known and used for decades, are now withdrawn from use, due to the risk of environmental contamination and toxic properties to humans. Such measures, which in the light of the applicable of European Union legislation on biocides, do not meet the toxicological and ecotoxicological requirements. Wood protection process is planned not only to ensure durability or use and optimum operating costs but also specific environmental and human health requirements.

First of all, it is important to choose high quality wooden materials, well dried and properly prepared for indoor installation. In this situation, it is worthwhile to bet on the quality of materials and pay more, but this investment will certainly return in the future. Wooden elements should be well dried. Using wet material is not a good idea - it will change its structure before it dries up. Moistened wood is also more susceptible to infection. Certainly not allowed to cover such material with lacquer, impregnate or oil paint. Once the wood has dried thoroughly, it is important to keep in mind that the good protection from moisture and fire . Wood must also be protected against parasites - it is recommended to cover it with impregnates with mildew and fungicide (Lefteris, 2005).

3.6. Wood types

Wood as the best common material can by classified into two categories : hardwood and softwood. And it does not provides woods hardness or strength .

Majority of softwoods have prickly leaves or stylus and are generally evergreens, but there are also expectations for example, western larch, which miss its needles every year. Softwoods are commonly coniferous, what means that their seeds are enclosed in cones. They usually grow quicker , are tender , and are easier to work with than hardwood. Hardwood usually have flat, vide leaves and have seeds that are enclosed in nuts or fruit , like acorns. Hardwood more often are typify by being deciduous or losing their leaves every years,but there are also a few expectations. Alike softwood and hardwood have samples for strong and durable types, but hardwoods are usually more stable as a reflection of their slower judge of growth and taut yearly ring models (Ballard, 2006)(Lefteris, 2005).

	SOFTWOOD	HARDWOOD
USE	80% of all tiber are softwood use for building components (windows, doors, furniture, paper, Christmas tree, accessories , and much more	High- quality furniture, decks, flooring, constructions,which need to last
EXAMPLES	cedar, douglas fir, juniper, pine, redwood, spruce or yew	alder,balsa,beech,hickory,mahogany,maple,oak,teak ot walnut
DENSITY	Most softwoods have a lower density than most hardwoods.	higher density than most of softwoods,
COST	less expensive compared to hardwood.	is more expensive
GROWTH	faster rate of growth.	growing slower
SHEDDING OF LEAVES	evergreen or tend to keep their needles throughout the year	lost in autumn and winter
FIRE RESISTANCE	poor	more

Fig.6. Softwood and Hardwood (Ballard, 2006)(Lefteris, 2005).

3.6.1 Hardwoods

Quercus Rubra - Red oak

Pic 1. Red oak

Pic 2. Red oak wood

Family	*Fagaceae*
orgin	North America
color	From white to light brown, with a pink to red-brown
tree type	This is a shade tree, mark a spreading canopy able of blocking sunlight.
mature size	About 30 m, sometimes to 50m high , and 1 to 2 m in diameter or more
growth rate	This oak grows at a fast rate
sun preference	Full sun in perfect condition for this tree, should get at least six hours of direct, unfiltered sunlight every day
soli preference	The tree grows in acidic, loamy, moist, sandy, well-drained and clay soils. But prefers normal moisture, and has some drought tolerance.
wood	Heavy, strong, hard and coarse-grained shrinks as it dries
workability	Medium workability, It is rated as a good timber for drilling, planing and moulding, and it stains and polishes to a high finish
availability	Very good price
use	Can be use in joinery, for furniture, fittings, flooring, stairs, construction
atributes	Oak wood is a universal material, oak furniture will work in interiors in a classic, rustic, colonial, Scandinavian, modern style

Fig 7. Red oak characterization (Nuck, 2012) (Bruce, 1990)(Bruce, 2000) (Lefteris, 2005).

Quercus alba – White oak

Pic 3. White oak tree

Pic 4. White oak wood

Family	*Fragaceae*
orgin	North America, europe
color	Has light-coloured sapwood and a light to dark brown heartwood.
tree type	This is a shade tree, with trunk short and compact, with strong branches growing out horizontally
mature size	Grows to a height of 20-25m but is possible to grows to 50m, and 1-1,5m in diameter
growth rate	Grows at a slow to medium rate
sun preference	Full sun in perfect condition for this tree, should get at least six hours of direct, unfiltered sunlight every day
soli preference	White oak prefers some acidic to neutral, deep, moist, well-drained soil. When adaptable to other soils, it is intolerant of alkaline, flat or abused urban soils. It can, tolerate medicore dry and occasional wet soil.
durability	Is non durable, is a hard, heavy wood, and has low stiffness and good overall strength, making it increasingly popular as a structural timber
workability	Medium workabilty
wood	Is a hard and heavy wood, with low hardness and medium crushing and bending strength. It also has very good steam bending properties
use	White oak is used for a large grupe of applications, like, flooring, architectural joinery, exterior . It is also an good timber for high-grade furniture, interior woodwork and paneling.
atributes	Oak wood is a universal material, oak furniture will work in interiors in a classic, rustic, colonial, Scandinavian, modern style

Fig 8. White oak characterization (Nuck, 2012) (Bruce, 1990)(Bruce, 2000) (Lefteris, 2005)

Acer rubrum - Red Maple

Pic 5. Maple tree

Pic 6. Maple wood

Family	*Aceraceae*
orgin	Europe, Western Asia , north America
color	Pale brown, beige-cream, with slight gray or pink hues
tree type	It has been set deeply as an ornamental and shade tree
mature size	Has large, spreading crown , and is growing to 25-35m tall and 60-80 cm in diameter but can be also over 150cm.
growth rate	It is a fast-growing species
sun preference	In natural departments it grow in fresh and humid sites in moderate mixed forests, both with conifers and broadleaves with much sun, is light-demanding
soli preference	Is able to grow in a wide range of soils and habitat conditions. Strong calcareous soils are well tolerated.Acer intolerant of low soil nitrogen conditions, high evapo-transpiration or others prolonged drought and it is rare on acidic soils
wood	Is mostly free of serious diseases
workability	Medium workability
availability	Is attractive timber, very resistant to abrasion. Is plentiful , is easy to use and economical to use.
use	Is used for music instruments, furniture, flooring,paneling,handles
atributes	- Is easy to work with - Planes very well, to a smooth surface - The texture is fine and even - Easy to cut because takes a sharp edge - Is finishes well - Inexpensive and readily available

Fig 9. Red maple characterization (Nuck, 2012) (Bruce, 1990)(Bruce, 2000) (Lefteris, 2005).

Prunus serotina - Black cherry

Pic 7. Black cherry tree

Pic 8. Black cherry wood

Family	*Rosaceae*
orgin	North America
color	The cherry has white creamy, which contrasts sharply with the reddish hue of hardwood. The cherry wood is rich in small dark brown resin spots that are markedly stacked along the jars. Cherry very much changes color - intensely darkens with time.
tree type	Has a fine to medium texture with straight grain
mature size	15 - 30 m
workability	Cherry is known as being one of the best all-around woods for workability. It is stable, straight-grained, and machines well. The only difficulties typically arise if the wood is being stained, as it can sometimes give blotchy results
strengths	- Fine, even texture - Straight grain - Easy use - Finishes well
sustainability	There should not be a problem with sustainability of this tree. Certified board are readily available
availability	Widely available but rising in price
use	Furniture and cabinetmaking ,veneers, turning, carving, quality joinery and trim, musical instruments , boat building
atributes	- Most favored lumber in the workshop - Rarely outstanding figure - Easy, does not dull blades and tends not to tear - Joints and profiles and be cut with ease - Faily hard, hard strong and very close-grained - Not shrink or wrap

Fig 10. Black cherry characterization (Nuck, 2012) (Bruce, 1990)(Bruce, 2000) (Lefteris, 2005).

Juglans nigra - Black Walnute

Pic 8. Black Walnute tree

Pic 10. Black Walnute wood

Family	*Juglandaceae*
orgin	North America ,Europe, Azia
color	Dark brown with some lighter streaks , fading toward the edges with a faint purple hue
tree type	Big tree, trunk straight
mature size	30 - 50m
strenght	- Widely availably and cost-effective - Goos substitute for more expensive dark woods - Straight- grained and easy to use - Finishes beautiful - Interesting color and texture
weaknesses	- Dusty to machine, with an unpleasant odor - Causes some dulling of cutting edges - Finishes can mist - Coarse texture - Soft, and bruises easily
hardnes	Soft to medium for hardwood
durability	Moderate, needs preservative for extremal use
workability	Very easy to use , with small wastage , because the sapwood id very thin. Easy work with machines and hand tools and takes a sharp edge from cutters. Can be dusty.
availability	Is easy to find at hardwood suppliers. Very low wastage rates make this wood a good value
use	Furniture and cabinet market, interior joiner, carving, gunstock, boats
atributes	- good finish from saws, jointers and planers - routs beautifully with moderate dulling - shine and takes most polished well

Fig 11. Black Walnute characterization (Nuck, 2012) (Bruce, 1990)(Bruce, 2000) (Lefteris, 2005).

3.6.2. Softwoods

Pinus strobus - White Pine

Pic 11. White Pine tree

Pic 12. White Pine wood

Family	*Pinaceae*
orgin	North America
color	light brown, sometimes with a slightly reddish hue, sapwood is a pale yellow to nearly white. Color tends to darken with age.
tree type	Is large tree, with straight grain, can be earlywood and latewood
mature size	20-30m (50m)
strenght	easy to work seasons well, stable once dry uniform texture
weaknesses	week not durable
sustainability	Grown extensively, and under no treat
workability	Is easy to work with both machine and hand tools. Well glues and finishes.
availability	Widely available and economical
use	Interior furniture, interior trim, widows shutters, laths, plywood, patter making, carving, instruments,boats
atributes	easy to surface, but with little risk of tearing good in shaping lumber is soft sandy soils forming homogeneous wood

Fig 12. White Pine characterization (Nuck, 2012) (Bruce, 1990)(Bruce, 2000) (Lefteris, 2005).

Fraxinus excelsior - European Ash

Pic 13. European Ash tree

Pic 14. European Ash wood

Family	*Fraxinaceae*
orgin	Europe , Asia
color	Light to medium brown color, though darker streaks. Most are very white and tends to be a beige or light brown. Sometimes turns to yellow when exposed to light
tree type	The grain is almost always straight and regular , sometimes curly or figured
mature size	20-35m (40m)
workability	Takes an edge beautifully, but curving grain can catch tear or splinter.
strengths	strong, with excellent bending qualities distinctive grain pattern nice effects with stain very little sapwood few defects
sustainability	Some certified stocks available, but it is under no threat.
availability	It is easy to find and the cost is not high. Wastage is low,tough watch out for end splits
use	Interior : furniture making, stained office furniture, utility, tool handless, sport equipment, boat building
atributes	Heartwood is not demarcated from sapwood The wood is hard and heavy good strength properties fast growing

Fig 13. European Ash characterization (Nuck, 2012) (Bruce, 1990)(Bruce, 2000) (Lefteris, 2005).

Fagus sylvatica - European Beech

Pic 15. European Beech tree

Pic 16. European Beech wood

Family	*Fagaceae*
orgin	Europe
color	Beech is pale cream color, sometimes white a pink or brown hue.
tree type	Grain is straight, white a fine to medium
mature size	30-40m
workability	Is good workability, it machines well, glues, finishes and turns. Responds superbly to steam-bending. Large amount of movement is service.
strengths	Consisten grain and texture Easy to use Inexpensives Hard ans Strong
sustainability	This wood is under attack from gray squirrels, which strip the bark from trees, but also is not a threaten species. Is possible to fins certified lumber
availability	Is widely available across Europe and is very economically priced.
use	Interior design, mass-produced furniture, bentwood furniture, technical workshop, joinery
atributes	Getting yellow with age

Fig 14. European Beech characterization (Nuck, 2012) (Bruce, 1990)(Bruce, 2000) (Lefteris, 2005)

Thuja plicata - Western Red Cedar

Pic 17. Western Red Cedar tree

Pic 18. Western Red Cedar wood

Family	*Thujoideae*
orgin	North America
color	Reddish to pinkish brown, often with random streaks and banks of darker brown areas
tree type	Straight grain, big tree
mature size	50-60m
workability	Easy to work , with both tools. Dents and scratches very easily due to its softness.
strengths	It is easy to find and the cost is not high.
sustainability	This wood is under attack from gray squirrels, which strip the bark from trees, but also is not a threaten species. Is possible to fins certified lumber
availability	Is easy available wood
use	Exterior and interior design, boxes, furniture, crates, musical instruments
atributes	Commercially important lumber In the UK, the tree is often planted in as hedging in gardens or for timber. most durable in the world

Fig 15. Western Red Cedar characterization (Nuck, 2012) (Bruce, 1990)(Bruce, 2000) (Lefteris, 2005).

3.7. Bambusa Shreb - Bamboos

Pic 19. Bamboos tree

Pic 20. Bamboos wood

Family	*Gramineae*
orgin	Asia
color	Yellow to almost white
tree type	Is a tall grass
mature size	15-30m
workability	Is not hard to work with, but it depends on the species. May require special care.
strengths	Is very very strong
sustainability	This wood species is not listed in the CITES Appendices or on the IUCN Red List of Threatened Species.
availability	Is available in 3 forms, in hollow turning-blank sizes from giant bamboo species; in glued-up boards (flooring) and sheets made from many smaller strips; and in paper-backed veneer
use	Flooring, fishing rods, ladders, scaffolding, musical instrument, furniture, window blinds, carving, turned items, and small novelty items. paper
atributes	Is the best eco friendly grass Is one of the most unique plants on earth After one year, bamboo reaches its full height Bamboo is built in the shape of a pipe

Fig 16. Bamboos characterization (Nuck, 2012) (Bruce, 1990)(Bruce, 2000) (Lefteris, 2005).

4. Wood in interior design use

Wood is one of the most famous, used and understood material. It is easy for everyone to name a few different species. Oak, Mahogany, Cherry, Walnut, Pine or Ash. From these kinds of woods we are dealing every day, we know them from the language of products and consumerism, they are sold on the basis of about their different qualities. Wood makes us material experts. All of us, have a different taste and, in consumerist life, will find and choose a wood which will suit our living room floor or eating table. Wood is strong, natural, aesthetic, organic, readily accessible, lightweight and simple material to work. They are many different colors, textures, patterns, which gives many possibilities to use wood in interior design. Because of that, there is a big range of choices and editions that can help us designing in wood. Choices of the types of wood genus or wood products and their grades and rate also result in a design as a score.The score of wood types available is visibly great, with selections that set the profit, color, size, sustainability, cost, and accessibility if the wood itself, which change over various geographic localizations. Different kinds can have different colors from black to red to faint cream, and no personal types ever have the same strict look as the others. Moreover, there are, certain wood kinds that are used for specific goal - fir, pine, and spruce are the most frequently used for structural, when more sophisticated woods like cherry, birch are richer in outlook, are used for interiors, furniture and finishing accessories. (Ballard, 2006) (Lefteris, 2005).

4.1. Use of wood in interiors

Wood is the biggest trend in the interior design use. Wood in the interior is irreplaceable material. The advantage of wood is the natural look and the freshness of the interior. It is also classy, beautiful, and multi-functional. Quality of wood can ensure that it will be always the most wanted material for interior design use. It fits both for the traditional interiors and modernist projects. Especially that it can be used in any natural tone and adapted to the most individualized needs - says Rafał Grudziąż.[1]

Wood in interiors is usually associated with floors and furniture. However, not only for this, we can use the wood.

Wood can be used for example for:

[1] Rafał Grudziąż, the architect from studio 81.WAW.PL.

- ceilings - ceiling designs can be made form differed types of wood and it gives aesthetic character of interior
- flooring - wooden flooring gives class to interiors. On the market they are many choices in term of wood, design, and finish;
- paneling- can be use for walls and wainscoting
- furniture (chairs, coaches , tables, beds, bars, trolleys, shelving, consoles, wardrobes , cabinets and any other furniture can be made of wood)
- doors, windows, shutters, screens, staircase, verandas, balcony railings, balustrades, counters, cabinets, craft bathtubs, sinks, trusses, beams, louvers, pillars, clapboards
- accessories, frames for photographs, artwork, sculptures, statues, artistic installations (Gibbs.N, 2012) (Hoadley.R.B, 2000),(Hoadley.R.B, 1990).

4.2. Wood in public interiors

With the more profound character of the premises, the owner wants to get as close as possible to the customer, offering him maximum comfort, but also the original surface concept. "The natural consequence of social preference, favoring public spaces" with soul "is fully functional, both as a symbol of elegance and comfort, of opening up to nature and respecting its rights. This raw material is valued in complex offers, luxury hotels, colleges, and Philharmonic. Where it is a symbol of prestige, and with unification connectors, it easily fits in different arrangements in different styles. In addition, more and more often are local products are adopted within such interior.

Durable natural wood decoration projects for public interior projects will serve and look splendid at any public place.

The cozy, warm and natural wood interior is a very reasonable solution for modern public place decoration. The naturalness of hardwood will give a good feeling for anyone who comes seeking for leisure activities, sports, relaxation, simply doing business with you or visits your public place for any other purpose. The properly selected wood in interior spaces shapes harmony of modern style and nature. Increasingly modern interior creators turn to the building's interior accents made using natural materials.

Oak, maple, ash infuses interior the original character, coziness or becomes modern interior decorating accent.

Subtle wood texture, color, highlighted bark cracks — such chosen solutions for interior decoration professional designers suggest to implement.

Designers decorate interiors with wood, including hardwood furniture for commercial premises and places:

- offices, restaurants, hotels, caffes, bars, pubs, retail, beauty, public premises, medical and care, sport clubes, SPA, pools, leisure centres, tourism objects, summer and rural houses

(Gibbs.N, 2012) (Hough R.B, 2007)

Puplic places with interiors shaped by timber

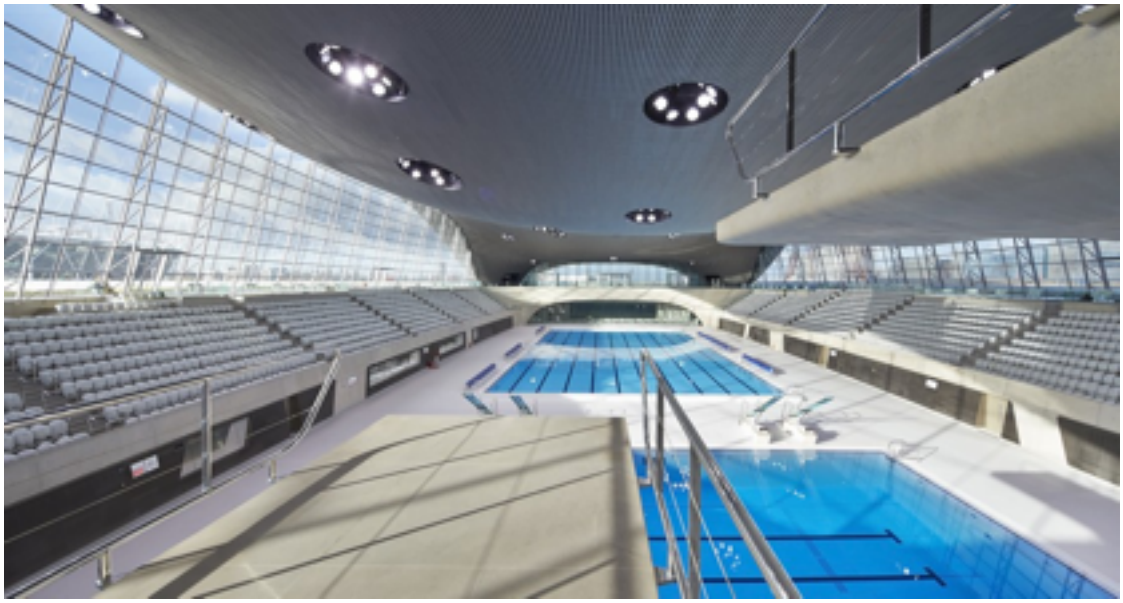
Vennesla Library and Culture House
Architects: Helen & Hard (Reinhard Kropf, Siv Helene Stangeland, Håkon Minnesjord Solheim, Caleb Reed, Randi Augenstein)
Location: Vennesla, Norway
Project Year : 2011
Photographs : Emile Ashley

Pic 21. Vennesla Library and Culture House ,

Library of the Institute of Law
Architects: Santiago Calatrava
Location: Zurich, Switzerland
Project Year : 2004

Pic 22. Library of the Institute of Law

London Aquatics Centre for 2012 Summer Olympics
architects: Zaha Hadid Architects
Location:London, United Kingdom
Project Year : 2012
Photographs: Hélène Binet



Pic 23.. Aquatics Centre in Stratford

National Assembly for Wales
Architects: Richard Rogers Partnership
Location:Cardiff, United Kingdom
Project Year : 2005

Pic 24. National Assembly for Wales

4.3. Examples of wood use

Wood has been used in interior design since time immemorial. This classy, beauty and multi functional material can make any kind of interior. Wood is used in construction for ages but beauty and longevity of wood along with it is veracity ensure, that it will remind best choice in interior design scenery. Wood is used extensively in interior design, for trusses, beams and pillars. Also is a best material for ceilings, flooring, walls, for doors, windows, shutters and screens. It is popular to make wooden furniture in many deigns and styles. Furniture serves functional and aesthetic purposes. Couches, chairs, tables, beds, bars, shelving, consoles, wardrobes and cabinets….all types of furniture can be made of wood. Home accessories playing very important rule. Wooden frames, musical instruments, scalpers, crafts, lamps, mirrors and much more.

Pic25. Walnut wood triangles come together in faceted formation, combining the warmth and texture of natural wood with smooth brushed metal accents. With the same eye towards modernism and drive for function one expects from a Cerno design, the large square aperture provides plenty of downward lighting. The Calx is dimmable for extra ambience, making it ideal for any modern interior.

Pic26. Wooden Table by George Nakashima (1905-1990)

Pic 27. A-Collection. Fabricated from oak and beech, the motivation for the series was an old wooden university trestle chair by architect Berndt Pedersen. Designed by Ronan and Erwan Bouroullec for Hay.

Pic 28. Medici Chair. Three types of wood: thermo-treated ash, walnut, and douglas are joined at irregular angles, resulting in a comfortably reclined seat. Designed by Konstantin Grcic for Mattiazzi.

Pic29. Re-Imagined Chairs. This project was born out of questioning resourcefulness
and attitudes towards waste. It builds on the interests in expediency and re-using the existing, and speaks to the ability to see the potential in the unwanted. Designed by Studiomama (Nina Tolstrup and Jack Mama).

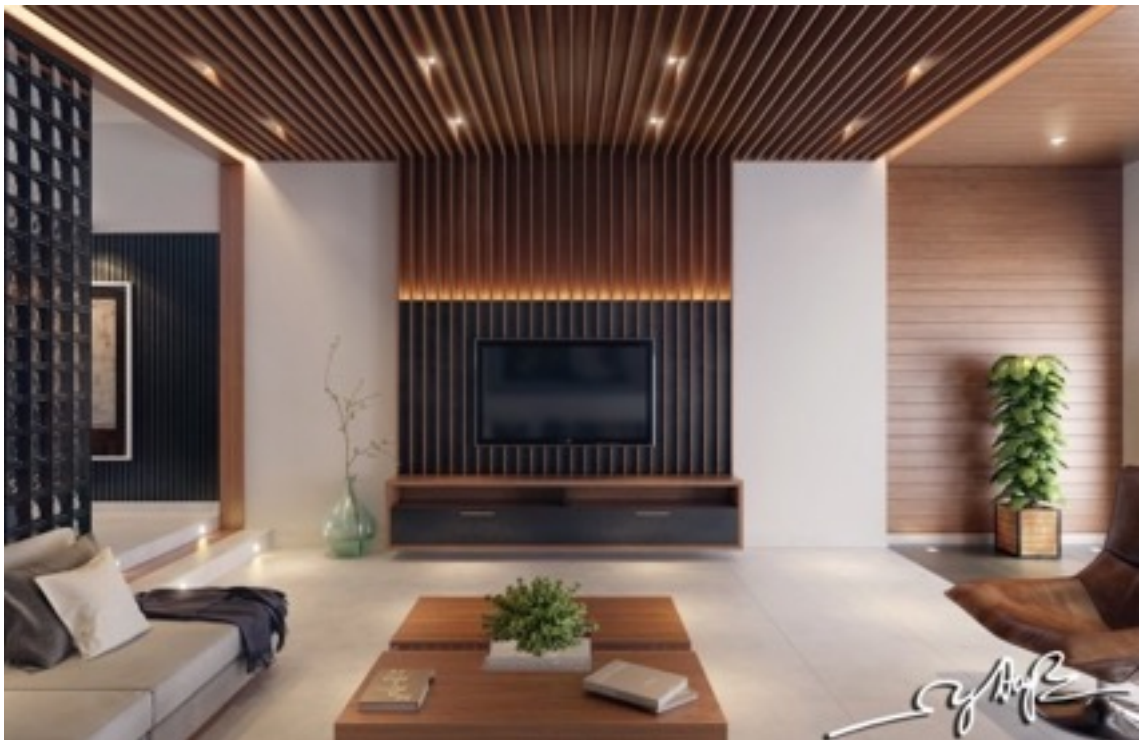
Pic30. Number one on our list is the amazing Capstan Table designed by David Fletcher. It's a round table with a simple and chic design and it hides a marvelous secret. The table can expand from a small size to a larger one while maintaining its circular design during the process.

Pic 31. The staircase Amsterdam is convincing through it´s simple design and light look. Wood and stainless steel are finished in highest quality by Siller Treppen

Pic 32. Wooden door by Holztür-Schiebetürsystem Komplett-SET Eiche One Board-LoftMarkt

Pic 33. Wooden mirror by Designer, Yuri Moshans

Pic 33. Design focal point to be marked about this extraordinary wood kitchen interior decoration is restful pitch touching unrefined design theme and component alternative, by decosse.com



Pic 34.By including greenery throughout this modern space, the designer adds both color and texture to the room. by Mariya Vergezova

Pic 35. Finally, the breakfast bar and small kitchen play wood off of marble, using their complementary colors and textures to beautiful effect. Project by Mariya Vergezova

Pic 36. The wooden space is open, with high ceilings and low sofas, but ultimately it feels safe.Interior design project by Fatma Beltagy

CONCLUSIONS

This work has helped to understand how little knowledge about our environment people have. We learned what an incredible material wood is, and how it has a good impact on people and the environment. Wood is the most powerful material in our interiors. Interesting was, during the process of writing this work, how our knowledge grown about recycling. What an amazing opportunity to improve our lives as well as the environment the recycling has. After the analysis of various types of wood, we already know which wood we should choose in our interiors. It is important to educate society. So much interesting information brings with it, ecology and ecological materials. We think that it is important that people is aware of recycling, what is important and what unsavory things can be obtained from stale materials. This work reveals to us how important it is to care about our health and about the environment.

Contact with nature in the modern world is of great importance for the physical and psychological well-being of humans. If possible, we should use as much natural materials as possible in our interiors. The use of ecological materials such as wood is the best way to improve the standard of living of people, as well as to improve the environment. The growing use of wood in interiors has many positive advantages. Wood is a material available in most countries as a versatile, naturally replenished raw material and is traditionally used to make homes and furniture, floors, ceilings, walls, home accessories, tools, art, paper and many other things. The sense of nature in buildings, through the use of natural materials improves physical and mental health, and therefore promotes well-being. A lot of studies have been carried out confirming the impact of wood on people.

Wood in interior design is an irreplaceable material. It fits both traditionally furnished, small apartments, as well as modernist, minimalist concepts. It tames the interior and makes the flat exude a characteristic warmth. Wood can be used in any natural tone and adapted to the most individualized needs. It is very important that the objects that surround us have a positive impact on us. Nonetheless, we can not forget about the environment. The method of producing the materials we use is also very important. We have only one environment that we need to care for. The impact of different materials on humans is a very important aspect, but we can not forget about the

environment. On the one hand, the basic physiological and economic needs of humans must be met, while at the same time remembering that there is a need to balance, harmonize and integrate the ecological environment. This interest in environmental responsibility has created a new trend in interior design. Often green and sustainable terms are used interchangeably in design. It is important, however, to distinguish these two terms. The green project refers to human issues - their health, safety and well-being; while sustainable design includes a more global approach - health, safety and prosperity of our planet. These factors lead to an increase in interest in environmentally friendly materials. They include greater awareness and sensitivity to the limited natural resources of the world; growing demand for healthier, more energy-efficient and environmentally friendly homes and workplaces. Interior design, materials and finishing require a significant amount of natural resources for their extraction, transport, processing, reuse, recycling and disposal. By integrating environmentally friendly materials with interior design, it is possible to significantly reduce environmental impact through lower energy consumption, reduced natural resources and environmental pollution, as well as less toxicity for both users and the entire ecosystem. Both of these factors minimize the negative impact on the environment and residents, while maximizing the positive impact on the life cycle of the building. An ideal summary is the words of Professor Denise A. Guerin and Mihyun Kang

‘one in which all systems and materials are designed with an emphasis on integration into a whole, for the purpose of minimizing negative impacts on the environment and occupant and maximizing positive impacts on environment, economic and social systems over the life cycle of a project’

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Pic 31, Available at WWW < https://www.architonic.com/en/product/siller-treppen-amsterdam/1169302>

Pic 32, Available at WWW < https://www.google.com/search?client=safari&rls=en&biw=1316&bih=756&tbm=isch&sa=1&ei=vCwYW8rQAs6PmwXum4CQDQ&q=wood+interior+furniture+door+by+designers&oq=wood+interior+furniture+door+by+designers&gs_l=img.3...3902.4548.0.4986.4.4.0.0.0.0.196.518.0j4.4.0....0...1c.1.64.img..0.0.0....0.EIQ2s0g93v0#imgdii=DUm3PRdL4whPNM:&imgrc=0gFyKTZSrt05pM:>

Pic 32, Available at WWW < https://www.google.com/search?q=wooden+mirror&client=safari&rls=en&source=lnms&tbm=isch&sa=X&ved=0ahUKEwi6l9jk27_bAhWlC8AKHQZ1BqQQ_AUICigB&biw=1316&bih=756>

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Pic 34, Available at WWW <,http://www.home-designing.com/2014/08/interior-design-close-to-nature-rich-wood-themes-and-indoor-vertical-gardens>

Pic 35, Available at WWW < http://www.home-designing.com/2014/08/interior-design-close-to-nature-rich-wood-themes-and-indoor-vertical-gardens>

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